

In the claims

Claims 1-4. (Cancelled)

5. (Amended) A method for calibrating vacuum nozzle positions in a component placement machine, the steps comprising:

- a) providing a component placement machine comprising a plurality of vacuum spindles, each being extendable and having a vacuum nozzle at a distal end thereof housing adapted for movement relative to a printed circuit board and having a frame rotatably attached thereto, said frame having a plurality of pick/place heads disposed thereupon, each of said pick/place heads comprising a vacuum spindle being extendable and having a vacuum nozzle at a distal end thereof, each of said plurality of vacuum nozzles being adapted for performing at least one of the operations of picking, holding, orienting, transporting, and placing a component relative to a printed circuit board;
- b) providing a vision system having a camera operatively disposed with respect to said plurality of vacuum nozzle comprising at least one camera, said camera operatively disposed with respect to and contiguous with said housing;
- c) picking a component from a supply of components using at least one of said plurality of vacuum nozzles;
- d) placing said component on said printed circuit board with at least one of said plurality of vacuum nozzles;

e) capturing an image of at least one of said plurality of vacuum nozzles after said placing with said camera; and

f) calibrating at least one of said plurality of vacuum nozzles using said captured image before said picking of next said component; and,

wherein said capturing an image step (e) and calibrating step (f) are accomplished substantially completely during at least one of said placing step (e) and said picking step (c).

6. (Original) The method for calibrating vacuum nozzle position in a component placement machine as recited in claim 5, wherein said calibrating step (f) comprises:

i) extending at least one said plurality of vacuum spindles to an extended position, before said capturing an image using said vision system; and

ii) determining a position of at least one of said plurality of vacuum nozzles within said captured image thereby creating a calibrated vacuum nozzle position for at least one of said plurality of vacuum nozzles.

7. (Original) The method for calibrating vacuum nozzle position in a component placement machine as recited in claim 5, wherein said calibrating step (f) further comprises:

iii) storing information representative of said calibrated vacuum nozzle position.

8. (Original) The method for calibrating vacuum nozzle position in a component placement machine as recited in claim 5, wherein said captured image of step (e) is captured in a plane.

9. (Cancelled)

10. (Original) The method for calibrating vacuum nozzle position in a component placement machine as recited in claim 6, wherein said picking step (c) further comprises using said calibrated nozzle position for picking a subsequent component.

11. (Original) The method for calibrating vacuum nozzle position in a component placement machine as recited in claim 5, wherein said vision system comprises at least one camera adapted to capture an image of at least one of said plurality of vacuum nozzles.